

**Gilles Consulting**

—— Brian K. Gilles ——

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**RISK ASSESSMENT OF SELECTED TREES  
FOR RISK**

**ALONG  
WOODMONT BEACH DRIVE SOUTH**

**Revised July 7, 2017**

**June 26, 2017**

**PREPARED FOR:**

**John Blackburn**

**Public Works & Parks Maintenance Superintendent**

**City of Des Moines**

**2255 South 223<sup>rd</sup> Street**

**Des Moines, WA 98198**

**PREPARED BY:**

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## **EXECUTIVE SUMMARY**

Several hundred trees were given a Level I Risk Assessment. Seventy four of these trees had signs and/or symptoms that warranted further study and were given a Level II Risk Assessment. This resulted in identifying many trees in the ravine, which are within striking distance of people and property, which have the potential to fail. They are recommended for management.

## **ASSIGNMENT**

John Blackburn, Public Works and Park Maintenance Superintendent for the City of Des Moines, Washington, contracted with Gilles Consulting to perform a risk assessment of the trees along Woodmont Beach Road South in Des Moines. Recent failures brought to light the need for the risk assessment. Mr. Blackburn requested that I look at trees within striking distance of the roadway on both sides of the road from just south of the intersection where Woodmont Beach Road South branches off Woodmont Drive South down to the house at 26744 Woodmont Beach Road South. Mr. Blackburn requested that I consolidate my observations, conclusions, and recommendations into this report for his use in managing the tree.

## **METHODOLOGY**

To evaluate the trees for risk, as well as to prepare this report, I drew upon my 30+ years of experience in the field of arboriculture and my formal education in natural resources management, dendrology, forest ecology, plant identification, and plant physiology. I followed the protocol of the International Society of Arboriculture (ISA) for tree risk assessment. Published in 2011, the *Best Management Practices, Tree Risk Assessment, ANSI A300 Part 9* was developed to aid in the interpretation of professional standards and guide work practices based upon current science and technology.

Using this process, now called the *Tree Risk Assessment Qualification*, or TRAQ for short, I performed a Level I Limited Visual Assessment of all the trees on both sides of the road. Those trees that appeared to have health issues or structural defects that could lead to failure were given a Level Two assessment. This includes looking at the overall health of the tree as well as the site conditions. This is a scientifically-based process ensuring an examination of the entire site, surrounding land and soil, as well as a complete look at the tree itself.

In examining each tree, I looked at such factors as: size, vigor, canopy and foliage condition, density of needles, injury, insect activity, root damage and root collar health, crown health, evidence of disease-causing bacteria, fungi or virus, dead wood and hanging limbs.

### Failure

While no one can predict with absolute certainty which trees will or will not fail, we can, by using this scientific process, assess which trees are most likely to fail and take appropriate action to minimize injury and damage.

### Tree Tags

The trees were tagged and numbered 1 through 74. The tags are made of shiny aluminum approximately one inch by three inches in size and are attached to the tree with staples and a short strip of brightly colored survey tape. The tags were placed as high as possible to minimize their removal. To assist in finding the correct tree, the tag number of each tree was painted on the side of the road in orange marking paint. Please refer to *Attachment 1, Photo of King County Assessor's Website* for an orientation to the site and the approximate location of the trees.



Photo # 1: Showing an aluminum numbered tag and short piece of survey tape stapled to it.

### Additional Testing

The trees all presented signs and/or symptoms that were readily discernible using the TRAQ Level Two evaluation system. These signs and/or symptoms indicate extensive internal decay and/or structural defects in some trees and solid trunks and lack of disease in others. Therefore, no additional tests were performed during this site visit.



## OBSERVATIONS

Woodmont Beach Road South is at the bottom of a steep ravine. The Ravine is heavily forested with a typical forest found in and around lowland Puget Sound. The typical mix of trees, shrubs, ground cover plants and invasive species are found in the ravine. The species composition of the 74 trees that received a Level II Risk Assessment can be summarized as follows:



**Photo # 2:** A typical photo of the forest on both sides of the road. Trees leaning to capture sunlight. Dense underbrush. English Ivy infestation.

SPECIES SUMMARY		
# Of Trees	Species	%
37	Big Leaf Maple	50.0%
1	Douglas Fir	1.4%
2	Grand Fir	2.7%
27	Red Alder	36.5%
7	Western Hemlock	9.5%
<b>74</b>	<b>Total:</b>	<b>100.0%</b>

The large number of Big Leaf Maple and Red Alder is easily understood based upon basic forest succession concepts. Maple and Alder are both known by forest ecologists as *primary cultivator species*. These species come into an area right after disturbance such as fire, logging, landslide etc. They grow fast, they grow large, they reproduce extensively, and, they have short life spans. They enrich the soil and provide a sheltered environment for the conifer and other longer-lived species to get started. In general, we can state that these two species are at the end of their expected life spans in the ravine. As they die out the conifers take over the forest. Another general

comment, due to the shelter of the ravine, several of the Red Alder trees are some of the largest in the region.

The general health of the 74 trees can be summarized as follows:

CURRENT HEALTH RATING SUMMARY		
# of Trees	Health Rating	%
5	Dead	6.8%
5	Dying	6.8%
43	Poor	58.1%
9	Fair	12.2%
12	Good	16.2%
<b>74</b>	<b>Total:</b>	<b>100.0%</b>

The health rating is a combination of both health and structural stability. This is important because any individual tree can be dead or dying and still be structurally sound. And, a healthy vigorous tree can have significant structural defects that could cause it, or parts of it, to fail and cause injury, harm, or disruption.

In an effort to present the information and conclusions for each tree in a manner that is clear and easy to understand, as well as to save paper, I have included a detailed spreadsheet, Attachment 2, Tree Inventory/Condition Spreadsheet. All the same information from the ISA Tree Hazard Form is included in this spreadsheet and the attached glossary. The descriptions on the spreadsheet were left brief in order to include as much pertinent information as possible and to make the report manageable. The attached glossary provides a detailed description of the terms used in the spreadsheet and in this report. It can be found in Attachment 3, Glossary. A brief review of these terms and descriptions will enable the reader to rapidly move through the spreadsheet and better understand the information.

## CONCLUSIONS AND RECOMMENDATIONS

Based upon the health and structural conditions, the trees were given a Hazard/Risk Rating on a scale of one through four. They are defined as follows:

- 1) Tree or tree part has a likelihood of failure and impact that is *improbable*. Tree will not likely fail in a normal storm. Tree may not even fail in a severe storm.
  - i) Retain the tree for now and monitor the tree in the future.
- 2) Tree or tree part has a likelihood of failure and impact that is *Possible*. The tree is likely as not to fail in a normal winter storm. Could fail in a severe storm.
  - i) The tree is recommended for management in the next one to two years.
- 3) Tree or tree part has a likelihood of failure and impact that is *probable*.
  - i) The tree is recommended for management before the onset of the next storm season.
- 4) Tree or tree part has a likelihood of failure and impact that is *imminent*.
  - i) The tree is recommended for management right away—as soon as it can be arranged.

Based upon my assessment, ranked the 74 trees as follows:

<b>SUMMARY OF HAZARD RATINGS</b>		
<b># of Trees</b>	<b>Hazard Rating</b>	<b>%</b>
3	1	4.1%
19	2	25.7%
32	3	43.2%
11	4	14.9%
9	Split Rating	12.2%
<b>74</b>	<b>Total</b>	<b>100.0%</b>

Please note that there are 9 trees that have a split rating. This reflects the difference between the overall tree rating and the rating of one or more trunks or large scaffold branches. The trunk may be fine but has one or more branches that are dead or breaking off. Once these dead or broken branches or trunks are removed, the remainder of the tree will most likely be fine and can stay. Of course there may one or more trees that once the tree service is there they may discover other defects or additional decay that may require the complete removal or severe reduction of the main trunk(s) to reduce the risk to an acceptable level.

Based upon these hazard ratings, the following recommendations are made:

<b>RECOMMENDATIONS SUMMARY</b>		
<b># of Trees</b>	<b>Recommendation</b>	<b>%</b>
23	Habitat	31.1%
20	Habitat or Remove	27.0%
20	Prune Dead Wood	27.0%
6	Remove	8.1%
1	Coppice	1.4%
4	Retain and Monitor	5.4%
<b>74</b>	<b>Total:</b>	<b>100.0%</b>

- Habitat:
  - The tree should be converted to a short snag that is less than the distance to the nearest target so that when it falls it will not cause personal injury or damage.
  - The upper portions of the trunk can be put cross wise on the slope to help reduce erosion and recycle their nutrients back into the soil.
  - Please refer to *Attachment 4, Habitat Tree, Nurse Log, and Brush Pile Creation and Benefits* for more details on this very important topic.
- Habitat or Remove:
  - Based upon the recommendation of the tree service, the tree may be so decayed that it just needs to be cut down and converted into nurse logs and brush piles.
- Prune Dead Wood:
  - The main part of the tree is sound, and once the dead portions are removed the rest of the tree can stay.
- Remove:
  - The location of the tree in relation to one or more targets, or the extent of the decay may require the tree to be cut down completely and converted to nurse logs and brush piles.
- Coppice:
  - One Maple tree is a series of stump sprouts. The base is severely undermined.
  - One solution may be to remove the sprouts and leave the stump and roots to regenerate and continue to provide stability benefits.
- Retain and Monitor:
  - The tree appears solid and its likelihood of failure is improbable now. That may change in the future.
  - I recommend doing another risk assessment of the trees in the ravine in 2019.



Photo # 3: Example of dead and broken branches in a tree that have the potential to fail and injure someone, damage property, or disrupt the use of the road.



Photo # 3: Example of a large tree with dead branches in the canopy. In some cases removal of the dead branches is all that is necessary. In other trees, if there is extensive decay, the tree may need to be converted to a Habitat Tree, Nurse Log, and a Brush Pile.



### **WAIVER OF LIABILITY**

There are many conditions affecting the stability of a slope. The recommendations in this report are to reduce the risk of catastrophic tree failure only. It is not a guarantee against severe erosion or landslide. Tree, shrub, and groundcover roots cannot prevent deep-seated landslides from occurring. If a severe landslide occurs, all trees and vegetation will be swept away as part of the landslide. It is strongly recommended that a qualified geotechnical engineer be retained to review the recommendations involved in this report and the condition of the slope itself.

There are also many conditions affecting a tree's health and stability which may be present and cannot be ascertained, such as, root rot, previous or unexposed construction damage, internal cracks, stem rot and more which may be hidden. Changes in circumstances and conditions can also cause a rapid deterioration of slope stability. While I have used every reasonable means to examine the slope and all relevant factors, this tree management plan represents my opinion of the situation at this point in time. These findings do not guarantee future safety nor are they predictions of future events. It is the property owner/project manager's responsible to engage the services of a qualified

geotechnical engineer to ascertain the conditions of the slope and actions that will enhance or destabilize the slope.

As conditions change, it is the responsibility of the property owners to schedule additional site visits by the necessary professionals to ensure that the long-term success of the project is ensured. It is the responsibility of the property owner to obtain all required permits from city, county, state, or federal agencies. It is the responsibility of the property owner to comply with all applicable laws, regulations, and permit conditions. If there is a homeowners association, it is the responsibility of the property owner to comply with all Codes, Covenants, and Restrictions (CC&R's) that apply to tree pruning and tree removal.

This tree evaluation is to be used to inform and guide the client in the management of their trees. This in no way implies that the evaluator is responsible for performing recommended actions or using other methods or tools to further determine the extent of internal tree problems without written authorization from the client. Furthermore, the evaluator in no way holds that the opinions and recommendations are the only actions required to insure that the tree will not fail. A second opinion is recommended. The client shall hold the evaluator harmless for any and all injuries or damages incurred if the evaluator's recommendations are not followed or for acts of nature beyond the evaluator's reasonable expectations, such as severe winds, excessive rains, heavy snow loads, etc.

This report and all attachments, enclosures, and references, are confidential and are for the use of the client concerned. They may not be reproduced, used in any way, or disseminated in any form without the prior consent of the client concerned and Gilles Consulting.

Thank you for calling Gilles Consulting for your arboricultural needs.

Sincerely,



Brian K. Gilles, Consulting Arborist  
ISA Certified Arborist # PN-0260A  
ASCA Registered Consulting Arborist # RCA-418  
ISA TRAQ Qualified  
ISA TRAQ Certified Instructor

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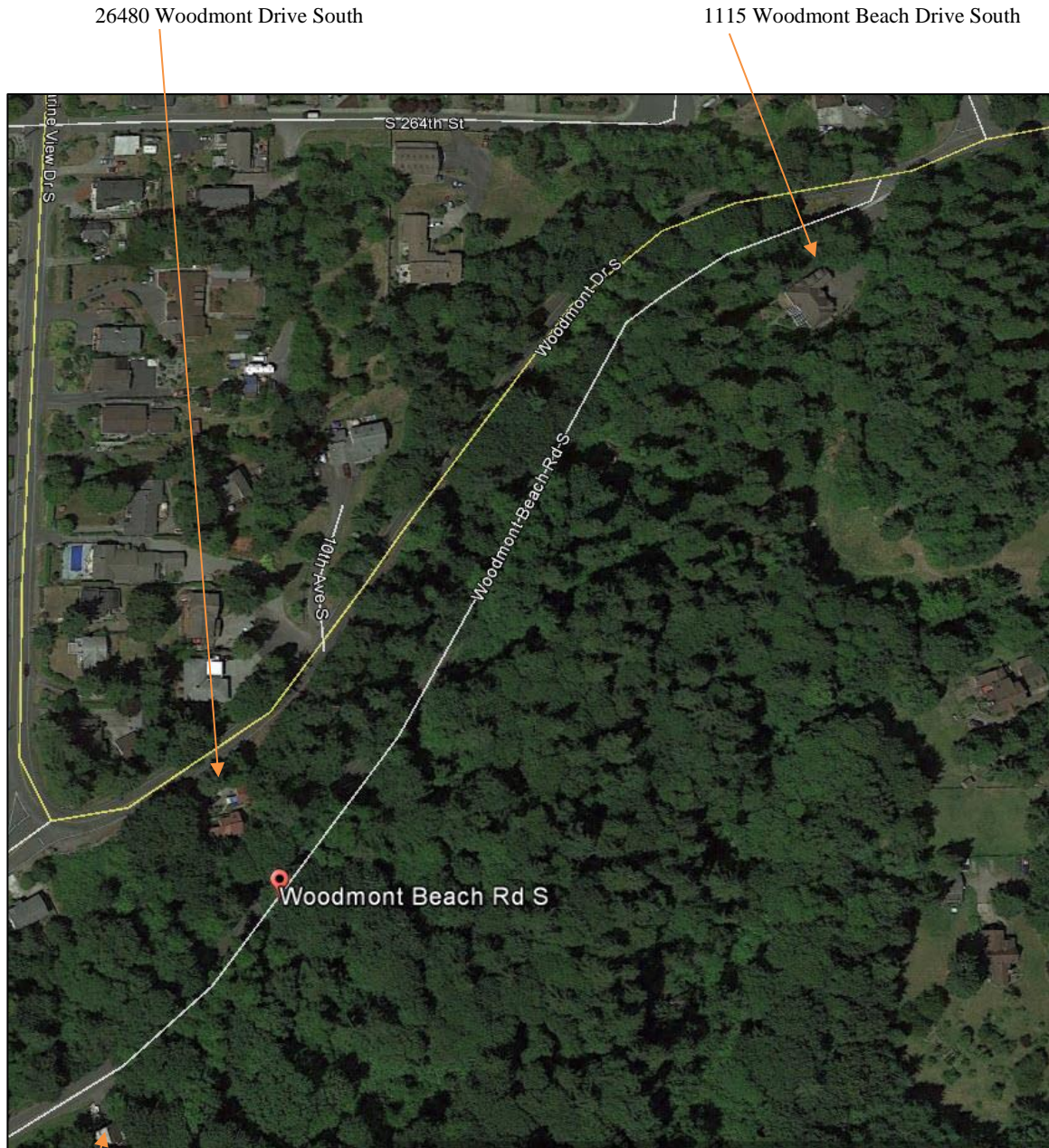
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## ATTACHMENT 1 - GOOGLE EARTH AERIAL PHOTO

An aerial photo captured from the Google Earth dated 6/27/16.



26744

Beginning here at the home at 26744 Woodmont Beach Drive South, we worked up the slope on the southeast side of the road to the driveway to the driveway at 111 Woodmont Beach Drive South. We then crossed over to the northwest side of the road and made our way back down the road to our starting point at 36744 Woodmont Beach Road South.

## ATTACHMENT 2 - TREE INVENTORY/CONDITIONS SPREADSHEET

ABBREVIATED LEGEND--SEE GLOSSARY BELOW FOR GREATER DETAIL															
#1	<b>Tree Location:</b> Relative placement of the tree.														
#2	<b>Tree #:</b> The unique tag number of each tree.														
#3	<b>Species:</b>														
	BLM/Am	Big Leaf Maple, <i>Acer macrophyllum</i>													
	DF/Pm	Douglas Fir, <i>Pseudotsuga menziesii</i>													
	GF/Ag	Grand Fir, <i>Abies grandis</i>													
	RA/Ar	Red Alder, <i>Alnus rubra</i>													
	WH/Th	Western Hemlock, <i>Tsuga heterophylla</i>													
#4	<b>DBH:</b> Trunk diameter @ 4.5' above average ground level.														
#5	<b>Drip Line:</b> The radius, the distance from the trunk to the furthest branch tips.														
#6	<b>LCR:</b> <i>Live Crown Ratio</i> - the amount of live canopy expressed as a % of the tree height.														
#7	<b>Symmetry:</b> General shape of canopy and weight distribution of the tree around the trunk.														
#8	<b>Foliage:</b> General description of foliage density that indicates tree health and vigor.														

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	sf
Tree Location	Tree #	Species	DBH	Drip Line	LCR	Symmetry	Foliage	Crown Condition	Trunk	Root Collar	Roots	Comments	Current Health Rating	Hazard Rating	Recommendation
SE slope	1	RA/Ar	20.7"	16'	75%	Major asymmetry	Average	Dying	Leans west	Exposed	Aerial to stream	Between slope and stream. Dead branches in canopy. Leans over driveway and is tall enough to reach the roadway. Rot pockets and branch collar wounds. Fungal infestation in trunk.	Poor	2	Habitat at 6' or remove
SE slope	2	BLM/Am	11.3"	14'	80%	Major asymmetry	Average	Regenerating average	Center rot	Base rot	Rot	Between road at stream.	Poor	3	Habitat at 6' or remove
SE slope	3	BLM/Am	16.4"	20'	45%	Major asymmetry	Average	Regenerating weak	Center rot	Base rot	Rot	Between road at stream.	Poor	3	Habitat at 6' or remove
SE slope	4	BLM/Am	15.7"	14'	85%	Major asymmetry	Stunted	Regenerating average	Center rot	Base rot	Rot	Between road at stream.	Poor	3	Habitat at 6' or remove
SE slope	5	BLM/Am	12.4, 11.8, 9.6"	12'	75%	Minor asymmetry	Average	Average	Forked at base, center rot	Base rot	Rot	Between road at stream.	Poor	3	Habitat at 6' or remove



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	sf
Tree Location	Tree #	Species	DBH	Drip Line	LCR	Symmetry	Foliage	Crown Condition	Trunk	Root Collar	Roots	Comments	Current Health Rating	Hazard Rating	Recommendation
SE slope	6	BLM/A m	16.8, 16.5, 18.1, 15.5"	18'	25%	Minor asymmetry	Average	Average	Center rot	Base rot	Rot	Between road at stream.	Poor	3	Habitat at 6' or remove
SE slope	7	BLM/A m	9.3"	12'	20%	Major asymmetry	Average	Average	Center rot	Base rot	Rot	Between road at stream. Dead branches in canopy.	Poor	2	Habitat at 6' or remove
SE slope	8	BLM/A m	24.0, 16.0, 12.5, 9.5, 6.5"	30'	55%	Minor asymmetry	Average	Average	Forked at 4', center rot	Base rot	Aerial, rot	Tree is 46 feet from edge of pavement. Growing out of nurse stump. Some storm damage and dead branches in canopy. Carpenter ant infestation.	Poor	3	Habitat at 6' or remove
SE slope	9	RA/Ar	27.4"	16'	35%	Minor asymmetry	Average	Weak	Serpentine, center rot	Base rot	Rot	Tree is 93 feet from edge of pavement. Rot pockets in branch collar wounds. Dead branches in canopy. Carpenter ant infestation.	Poor	3	Habitat at 6' or remove
SE slope	10	RA/Ar	28.7"	22'	65%	Minor asymmetry	Epicormic growth	Dying	Forked at 5.5' w/ included bark to base	Probable base rot	Probable rot	Tree is 89 feet from edge of pavement. Dead branches in canopy and rot pockets in branch collar wounds.	Poor	3	Habitat at 6' or remove
SE slope	11	BLM/A m	30.0"	30'	65%	Major asymmetry	Average	Weak	Previously topped at 14'	Exposed	NAD	Tree is 53 feet from edge of pavement. Canopy leans over the adjacent house with excessive end weight.	Fair	2	Reduce end weight over house and prune dead wood
SE slope	12	RA/Ar	26.5"	18'	20%	Major asymmetry	Average	Weak	Center rot	Exposed	NAD	Fungal infestation in trunk. Trunk leans towards road. Rot pockets.	Poor	2	Habitat at 6' or remove
SE slope	13	RA/Ar	14.5"	14'	35%	Minor asymmetry	Average	Weak	Leans towards road	Exposed	Probable rot	Tree is 81 feet from edge of pavement. Rot pockets.	Poor	2	Habitat at 6' or remove
SE slope	14	RA/Ar	49.4"	28'	50%	Major asymmetry	Thin	Weak	Forked at 4', center rot	Base rot	Rot	South trunk has a vertical crack from the base up 40 feet with decay. The 4th trunk is broken off at 9 feet with decay into the buttress roots. Carpenter ant infestation.	Poor	4	Habitat at 6' or remove

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Tree Location	Tree #	Species	DBH	Drip Line	LCR	Symmetry	Foliage	Crown Condition	Trunk	Root Collar	Roots	Comments	Current Health Rating	Hazard Rating	Recommendation
SE slope	15	RA/Ar	c/5	26'	80%	Major asymmetry	Average	Average	Forked at base, center rot	Base rot	Probable rot	Trunk diameters range from 20-28 inches. The north trunk has a rot column in a scaffold branch over the roadway. The south trunk leans up the slope. Fungal infestation in trunk. Dead branches in canopy. Tag is on the northern most trunk, directly across the stream.	Poor	3	Habitat at 6' or remove
SE slope	16	BLM/A m	est. 32.0"	30'	30%	Minor asymmetry	Average	Average	Probable center rot	Probable base rot	Probable rot	Tree is 108 feet from the edge of pavement. Dead branches in canopy.	Poor	2	Habitat at 6' or remove
SE slope	17	BLM/A m	est. 26.0"	20'	40%	Major asymmetry	Stunted	Weak	Center rot	Base rot	Rot	Tree is 102 feet from the edge of pavement. Dead branches in canopy.	Poor	4	Habitat at 6' or remove
SE slope	18	BLM/A m	est. 36.0"	26'	60%	Major asymmetry	Stunted	Dying	Forked, probable center rot	Probable base rot	Probable rot	Tree is 72 feet from the edge of pavement. Dead branches in canopy. Hangers in canopy.	Poor	2	Reduce by 40%
SE slope	19	BLM/A m	27.7"	28'	85%	Major asymmetry	Average	Average	Leans north over road	Exposed	NAD	Dead branches in canopy.	Good	2	Prune dead wood
SE slope	20	BLM/A m	Est 65.0"	46'	85%	Major asymmetry	Average	Average	Forked, center rot	Base rot	Rot	Tree is 50 feet from edge of pavement. Stump sprouts. Dead branches in canopy	Poor	3	Habitat at 6' or remove
SE slope	21	BLM/A m	Est 54 & 24"	48'	65%	Minor asymmetry	Average	Average	Forked at 4 & 8', center rot	Base rot	Rot	Tree is 40 feet from edge of pavement. Carpenter ant infestation. Dead branches in canopy.	Poor	3	Habitat at 6' or remove
SE slope	22	RA/Ar	38.0"	20'	10%	Major asymmetry	Sparse	Dead	Leans north towards road, center rot, bowed	Base rot	Rot, restricted	Tree is 72 feet from the edge of pavement. Dead branches in canopy. Rot pockets.	Poor	4	Remove
SE slope	23	RA/Ar	28.0"	28'	70%	Major asymmetry	Average	Average	Forked at 6 & 12'	Exposed	NAD	Fungal infestation in trunk. Hangers. Leans over road. Tree is 30 feet from edge of pavement.	Fair	2	Prune dead wood
SE slope	24	RA/Ar	31.2"	24'	50%	Major asymmetry	Average	Average	Serpentine	Partially exposed	Restricted	Fungal infestation in trunk. Tree is 20 feet from edge of pavement.	Fair	1	Monitor
SE slope	25	RA/Ar	25.6"	16'	35%	Major asymmetry	Thin	Weak	Center rot	Base rot	Rot	Tree is 20 feet from edge of pavement.	Poor	3	Remove

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	sf
Tree Location	Tree #	Species	DBH	Drip Line	LCR	Symmetry	Foliage	Crown Condition	Trunk	Root Collar	Roots	Comments	Current Health Rating	Hazard Rating	Recommendation
SE slope	26	RA/Ar	26.0"	16'	50%	Minor asymmetry	Average	Average	Leans southeast	Partially exposed	Restricted	Tree is 29 feet from edge of pavement. Multiple vertical cracks in trunk but appear to be in the bark only.	Fair	2	Monitor
SE slope	27	WH/Th	27.0"	18'	900 %	Minor asymmetry	Average	Regenerating average	Center rot	Base rot	Rot	Tree is 44 feet from edge of pavement. Growing out of nurse stump.	Poor	3	Habitat at 16'
SE slope	28	RA/Ar	23.3"	18'	45%	Minor asymmetry	Average	Average	Leans west, forked at 52'	Exposed	Restricted	Tree is 70 feet from edge of pavement.	Fair	2	Habitat at 16'
SE slope	29	RA/Ar	18.8"	16'	35%	Minor asymmetry	Average	Average	Leans north over road, center rot	Base rot	Rot, restricted	Tree is 20 feet from edge of pavement.	Poor	4	Habitat at ground
SE slope	30	WH/Th	16.5"	16'	60%	Minor asymmetry	Average	Average	Leans north	Previous failure	Previous failure	Tree is 25 feet from edge of pavement.	Poor	3	Habitat at 6' or remove
SE slope	31	RA/Ar	28.5"	20'	70%	Major asymmetry	Average	Average	Leans north over roadway	Partially exposed	Restricted	Tree is 25 feet from edge of pavement. Vertical crack in trunk.	Poor	3	Habitat at 3'
SE slope	32	BLM/A m	18.4"	22'	80%	Major asymmetry	Dense	Healthy	Typical	Exposed	Restricted	Tree is 20 feet from edge of pavement. Dead branches in canopy.	Good	2	Prune dead wood
SE slope	33	BLM/A m	33.0 & 24.0	30'	65%	Major asymmetry	Dense	Healthy	Center rot	Base rot	Rot	Tree is 58 feet from edge of pavement. Growing out of nurse stump.	Poor	3	Habitat at 12'
SE slope	34	BLM/A m	25.3"	22'	65%	Major asymmetry	Average	Average	Leans into canopy of tree 33	Previous failure	Previous failure	Tree is 85 feet from edge of pavement. Dead branches in canopy.	Poor	4	Habitat at 10'
SE slope	35	BLM/A m	33.2"	40'	80%	Minor asymmetry	Average	Average	Typical	Exposed	NAD	Tree is 87 feet from edge of pavement. Dead branches in canopy.	Good	3/1	Prune dead wood
SE slope	36	RA/Ar	32.5 & 25.5"	24'	85%	Major asymmetry	Thin	Weak	Forked at 3', center rot	Base rot	Rot	Tree is 59 feet from edge of pavement. Dead branches in canopy.	Poor	4	Habitat at 16'
SE slope	37	WH/Th	21.0"	16'	85%	Minor asymmetry	Average	Not observed	Straight	Exposed	Aerial	Tree is 48 feet from edge of pavement. Growing out of nurse stump.	Good	1	Monitor
SE slope	38	BLM/A m	36.4"	34'	95%	Major asymmetry	Average	Average	Slight lean north over road	Partially exposed	NAD	Tree is 55 feet from edge of pavement. Dead branches in canopy.	Good	3/1	Prune dead wood

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	sf
Tree Location	Tree #	Species	DBH	Drip Line	LCR	Symmetry	Foliage	Crown Condition	Trunk	Root Collar	Roots	Comments	Current Health Rating	Hazard Rating	Recommendation
SE slope	39	WH/Th	28.0"	18'	95%	Major asymmetry	Dense	Regenerating average	Forked at 40'	Exposed	Aerial	Tree is 50 feet from edge of pavement. Growing out of nurse stump. Trunks leans parallel to roadway.	Good	1	Monitor
SE slope	40	BLM/A m	46.0"	32'	40%	Minor asymmetry	Dense	Regenerating average	Leans north	Exposed	NAD	Tree is 78 feet from edge of pavement. Recent and historic storm damage at 50 feet. Dead branches in canopy.	Good	3/1	Prune dead wood
SE slope	41	BLM/A m	62 & 24.0"	34'	50%	Minor asymmetry	Average	Average	Leans north over roadway	Exposed	NAD	Tree is 46 feet from edge of pavement. Small trunk has center rot. Dead branches in canopy.	Good	3/1	Remove small trunk and prune dead wood
SE slope	42	RA/Ar	15.0"	16'	40%	Minor asymmetry	Thin	Weak	Leans north over roadway	Exposed	NAD	Tree is 41 feet from edge of pavement. Tag is tied to the holly on the north side. Dead branches in canopy.	Good	2	Habitat at 7'
SE slope	43	RA/Ar	16.5"	16'	45%	Major asymmetry	Epicormic growth	Average	Leans north over roadway	Base rot	Rot	Tree is 30 feet from edge of pavement. Fungal infestation in trunk. Topping wound kink at 20'.	Poor	3	Habitat at 4'
SE slope	44	BLM/A m	16.6, 13.5, 13.3	18'	85%	Minor asymmetry	Average	Average	Forked at base, center rot	Base rot	Rot	Northern most trunk is broken off at 34'. Rot pockets and dead branches in canopy.	Poor	3	Habitat at 12'
SE slope	45	BLM/A m	14.8 & 12.3"	26'	60%	Major asymmetry	Average	Average	Forked at 2', center rot	Base rot	Rot	Open wound on the north side. Carpenter ant infestation and dead branches in canopy.	Poor	3	Habitat at 12'
SE slope	46	BLM/A m	6.2"	12'	5%	Minor asymmetry	Sparse	Weak	Center rot	Base rot	Rot	Tree is 50 feet from edge of pavement.	Poor	3	Remove
SE slope	47	BLM/A m	28.2"	40'	40%	Major asymmetry	Average	Average	Center rot	Base rot	Rot	Tree is 55 feet from edge of pavement.	Fair	3	Reduce end weight and prune dead wood
SE slope	48	BLM/A m	29.8"	40'	60%	Major asymmetry	Average	Average	Leans north over roadway, center rot	Base rot	Rot	Tree is 50 feet from edge of pavement.	Fair	3/2	Prune dead wood
SE slope	49	BLM/A m	23.8"	22'	30%	Major asymmetry	Dense	Average	Leans north over roadway, center rot	Base rot	Rot	Tree is 51 feet from edge of pavement. Dead branches in canopy.	Poor	3	Habitat at 6' or remove
SE slope	50	BLM/A m	34.4"	38'	40%	Major asymmetry	Average	Average	Leans north over roadway, center rot	Exposed	Restricted	Tree is 40 feet from edge of pavement. Dead branches in canopy.	Good	3/1	Prune dead wood

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	sf
Tree Location	Tree #	Species	DBH	Drip Line	LCR	Symmetry	Foliage	Crown Condition	Trunk	Root Collar	Roots	Comments	Current Health Rating	Hazard Rating	Recommendation
SE slope	51	BLM/A m	25.9"	16'	25%	Major asymmetry	Thin	Weak	Center rot	Base rot	Rot	Tree is 69 feet from edge of pavement. Dead branches in canopy. Carpenter ant infestation.	Poor	3	Reduce by 30%
SE slope	52	BLM/A m	47.8"	36'	70%	Minor asymmetry	Average	Average	Leans north over roadway, center rot	Partially exposed	Restricted	Dead branches in canopy. Next to "Woodmont Park" sign.	Good	3/1	Prune dead wood
SE slope	53	BLM/A m	20.0, 18.0 & 14.0"	36'	60%	Major asymmetry	Average	Average	Forked at base, center rot	Base rot	Rot	Tree is 20 feet from edge of pavement. Dead branches in canopy.	Fair	3/2	Prune dead wood
SE slope	54	BLM/A m	37.4"	28'	45%	Minor asymmetry	Average	Average	Forked at 22'	Exposed	NAD	Dead branches in canopy.	Good	3/1	Prune dead wood
SE slope	55	BLM/A m	13.0"	16'	60%	Major asymmetry	Average	Regenerating average	Broken off at 18', center rot	Base rot	Rot	Carpenter ant infestation.	Poor	3	Remove
NW slope	56	BLM/A m	14.8, 13.3, 13.1 & 11.4"	26'	70%	Generally symmetrical	Average	Regenerating average	Center rot	Base rot	Rot	Hypoxylon. Stump sprouts. Previously topped at 26 feet. Carpenter ant infestation.	Poor	3	Remove
NW slope	57	BLM/A m	25.8, 13.7, 12.4 & 7.9"	36'	65%	Minor asymmetry	Average	Average	Forked at base, center rot	Base rot	Rot		Poor	3	Remove 3 small trunks
NW slope	58	RA/Ar	22.7"	0'	0%	n/a	None	Dead	Center rot	Base rot	Rot	Fungal infection in trunk.	Dead	4	Habitat at 8'
NW slope	59	RA/Ar	16.4"	12'	5%	Major asymmetry	Sparse	Dead	Leans over roadway	Partially exposed	Probable rot	Fungal infection in trunk.	Dying	4	Habitat at 5'
NW slope	60	RA/Ar	18.6"	20'	40%	Minor asymmetry	Thin	Dying	Typical	Partially exposed	Probable rot	Fungal infection in trunk.	Poor	2	Habitat at 6'
NW slope	61	RA/Ar	22.5"	20'	20%	Major asymmetry	Sparse	Dead	Fork at 8'	Probable base rot	Probable rot	Fungal infection in trunk.	Dying	3	Habitat at 5'
NW slope	62	RA/Ar	23.7"	20'	45%	Major asymmetry	Sparse	Dying	Center rot	Probable base rot	Probable rot	Leans over Woodmont Beach Drive. Fungal infection in trunk.	Dying	3	Habitat at 4'
NW slope	63	WH/Th	14.0"	0'	0%	n/a	None	Dead	Center rot	Base rot	Rot	Carpenter Ant infestation. Woodpecker activity.	Dead	4	Habitat at 4'



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	sf
Tree Location	Tree #	Species	DBH	Drip Line	LCR	Symmetry	Foliage	Crown Condition	Trunk	Root Collar	Roots	Comments	Current Health Rating	Hazard Rating	Recommendation
NW slope	64	BLM/Am	Est. 55.0"	30'	35%	Minor asymmetry	Sparse	Dying	Center rot	Base rot	Rot	Downslope side is dying rapidly. Carpenter Ant infestation.	Poor	2	Remove rotten trunks on downslope side, then decide on the rest of the trunks then
NW slope	65	RA/Ar	14.0"	0'	0%	n/a	None	Dead	Center rot	Base rot	Rot	Tag is on guard rail post. Carpenter Ant infestation. Woodpecker activity.	Dead	4	Habitat at 6'
NW slope	66	RA/Ar	16.5"	16'	10%	Major asymmetry	Sparse	Dying	Center rot	Base rot	Rot	Vertical cracks in lower trunk. Rot pockets in branch collar wounds. Carpenter Ant infestation. Woodpecker activity.	Poor	3	Habitat at 5'
NW slope	67	RA/Ar	18.7"	16'	65%	Minor asymmetry	Average	Average	Center rot	Base rot	Rot	Root collar is exposed. Main leader broken out years ago with decay column to the base.	Poor	2	Habitat at 6'
NW slope	68	WH/Th	Est. 19.0"	14'	10%	Major asymmetry	Sparse	Dead	Center rot	Base rot	Rot	Possible spiral lightning strike. Carpenter Ant infestation. Woodpecker activity. Tag on guard rail post. Tree is app. 2/3rds down from Woodmont Dr.	Dying	3	Habitat at 6'
NW slope	68B	RA/Ar	Est. 12'	0'	0%	n/a	None	Broken out	Center rot	Base rot	Rot	Tag is on guard rail post. Carpenter Ant infestation. Woodpecker activity.	Dead	4	Habitat at 6'
NW slope	69	WH/Th	Est. 6"	0'	0%	n/a	None	Broken out	Center rot	Base rot	Rot	Tag is on guard rail post.	Dead	4	Remove.
NW slope	70	GF/Ag	Est. 26"	10'	1%	Major asymmetry	Sparse	Dead	Center rot	Base rot	Rot	English Ivy infestation. Tag is on the guard rail post.	Dying	2	Habitat at 8'
NW slope	71	GF/Ag	Est. 38"	18'	15%	Major asymmetry	Short shoot Elongation	Dead	Center rot	Base rot	Rot	English Ivy infestation. Tag is on the guard rail post.	Poor	2	Habitat at 6'
NW slope	72	DF/Pm	Est. 18"	12'	25%	Major asymmetry	Average	Average	Center rot	Base rot	Rot	Vertical cracks in trunk. Tree leans south.	Poor	3	Remove
NW slope	73	BLM/Am	Clump of 8	24'	80%	Generally symmetrical	Dense	Regen - Healthy	Stump sprouts	Root collar completely undermined	Horizontal at top of road cut	No tag.	Fair	2	Remove or coppice

## ATTACHMENT 3 - GLOSSARY

### Terms Used in This Report, on the Tree Condition / Inventory Spreadsheet, and Their Significance

In an effort to clearly present the information for each tree in a manner that facilitates the reader's ability to understand the conclusions I have drawn for each tree, I have collected the information in a spreadsheet format. This spreadsheet was developed by Gilles Consulting based upon the *Tree Risk Assessment in Urban Areas and the Urban/Rural Interface* course manual and the *Tree Risk Assessment Form*, both sponsored by the Pacific Northwest Chapter of the International Society of Arboriculture, and the *Hazard Tree Evaluation Form* from the book, *The Evaluation of Hazard Trees in Urban Areas*, by Matheny and Clarke. The descriptions were left brief on the spreadsheet in an effort to include as much pertinent information as possible, to make the report manageable, and to avoid boring the reader with infinite levels of detail. However, a review of these terms and descriptions will allow the reader to rapidly move through the report and understand the information.

- 1) **TREE LOCATION**—A general description of whether the tree is on the southeast slope or on the northwest slope.
- 2) **TREE #**—the unique tag number of each tree.
  - i) There is a 1" x 3" aluminum tag with the tree numbers imprinted on the tag. They are fastened to the tree with a staple and a short length of bright survey tape to aid in confirming tree numbers.
  - ii) The numbers for each tag are also painted on the edge of the road pavement with orange survey paint. The last numbers, 68 through 73 are painted on Woodmont Drive South. While numbers 1 through 67 are painted on either side of Woodmont Beach Road South.
- 3) **SPECIES**—this describes the species of each tree with both most readily accepted common name and the officially accepted scientific name.
- 4) **DBH**—Diameter Breast Height. This is the standard measurement of trees taken at 4.5 feet above the average ground level of the tree base.
  - i) Occasionally it is not practical to measure a tree at 4.5 feet above the ground. The most representative area of the trunk near 4.5 feet is then measured and noted on the spreadsheet. For instance, a tree that forks at 4.5 feet can have an unusually large swelling at that point. The measurement is taken below the swelling and noted, e.g. '28.4" at 36"'.
    - (1) Every effort is made to distinguish between a single tree with multiple stems and several trees growing close together at the bases.
  - ii) Trees with multiple stems are listed as a "clump of x," with x being the number of trunks in the clump. Measurements may be given as an average of all the trunks, or individual measurements for each trunk may be listed.
- 5) **DRIP LINE**—the radius, the distance from the trunk to the furthest branch tips.

- 6) **% LCR**—Percentage of Live Crown Ratio. The relative proportion of green crown to overall tree height. This is an important indication of a tree's health. If a tree has a high percentage of Live Crown Ratio, it is likely producing enough photosynthetic activity to support the tree. If a tree has less than 30% to 40% LCR, it can create a shortage of needed energy and can indicate poor health and vigor.
- 7) **SYMMETRY**—is the description of the form of the canopy, i.e., the balance or overall shape of the canopy and crown. This is the place I list any major defects in the canopy shape, e.g. does the tree have all its foliage on one side or in one unusual area? Symmetry can be important if there are additional defects in the tree such as rot pockets, cracks, loose roots, weak crown, etc. Symmetry is generally categorized as Generally Symmetrical, Minor Asymmetry or Major Asymmetry:
  - i) Gen. Sym.—Generally Symmetrical. The canopy/foliage is generally even on all sides with spacing of scaffold branches typical for the species, both vertically and radially.
  - ii) Min. Asym.—Minor Asymmetry. The canopy/foliage has a slightly irregular shape with more weight on one side, but appears to be no problem for the tree.
  - iii) Maj. Asym.—Major Asymmetry. The canopy/foliage has a highly irregular shape for the species with the majority of the weight on one side of the tree. This can have a significant impact on the tree's stability, health and hazard potential—especially if other defects are noted such as cracks, rot, or root defects.
- 8) **FOLIAGE/BRANCH**—describes the foliage of the tree in relation to a perfect specimen of that particular species. First the branch growth and foliage density is described, and then any signs or symptoms of stress and/or disease are noted. The condition of the foliage, or the branches and buds for deciduous trees in the dormant season, are important indications of a tree's health and vigor.
  - i) For Deciduous trees in the dormant season:
    - (1) The structure of the deciduous tree is visible.
    - (2) The quantity and quality of buds indicates health, and is described as good bud set, average bud set, or poor bud set. These are abbreviated in the spreadsheet as: gbs, abs, or pbs.
    - (3) The amount of annual shoot elongation is visible and is another major indication of tree health and vigor. This is described as:
      - a) Excellent, Good, Average, or Short Shoot Elongation. These are abbreviated in the spreadsheet as ESE, GSE, ASE, or SSE.
  - ii) For evergreen trees year round and deciduous trees in leaf, the color and density of the foliage indicates if the tree is healthy or stressed, or if an insect infestation, a bacterial, fungal, or viral infection is present. Foliage is categorized on a scale from:
    - (1) Dense—extremely thick foliage, an indication of healthy vigorous growth,
    - (2) Good—thick foliage, thicker than average for the species,
    - (3) Normal/Average—thick foliage, average for the species, an indication of healthy growth,

- (4) Thin or Thinning—needles and leaves becoming less dense so that sunlight readily passes through; an indication that the tree is under serious stress that could impact the long-term survivability and safety of the tree,
  - (5) Sparse—few leaves or needles on the twigs, an indication that the tree is under extreme stress and could indicate the future death of the tree,
  - (6) Necrosis—the presence of dead twigs and branchlets. This is another significant indication of tree health. A few dead twigs and branches are reasonably typical in most trees of size. However, if there are dead twigs and branchlets all over a certain portion of the tree, or all over the tree, these are indications of stress or attack that can have an impact on the tree's long-term health.
  - (7) Hangers—a term to describe a large branch or limb that has broken off but is still hanging up in the tree. These can be particularly dangerous in adverse weather conditions.
- 9) **CROWN CONDITION**—the crown is uppermost portion of the tree, generally considered the top 10 to 20% of the canopy or that part of the canopy above the main trunk in deciduous trees and above the secondary bark in evergreen trees.
- i) The condition of the tree's crown is a reflection of the overall health and vigor of the entire tree. The crown is one of the first places a tree will demonstrate stress and pathogenic attack such as root rot.
  - ii) If the **Crown Condition** is healthy and strong, this is a good sign. If the crown condition is weak, broken out, or shows other signs of decline, it is an indication that the tree is under stress. It is such an important indication of health and vigor that this is the first place a trained forester or arborist looks to begin the evaluation of a tree. Current research reveals that, by the time trees with root rot show significant signs of decline in the crown, fully 50% or more of the roots have already rotted away. **Crown Condition** can be described as:
    - (1) Healthy Crown—exceptional growth for the species.
    - (2) Average Crown—typical for the species.
    - (3) Weak Crown—thin spindly growth with thin or sparse needles.
    - (4) Flagging Crown—describes a tree crown that is weak and unable to grow straight up.
    - (5) Dying Crown—describes obvious decline that is nearing death.
    - (6) Dead Crown—the crown has died due to pathological or physical injury. The tree is considered to have significant stress and/or weakness if the crown is dead.
    - (7) Broken out—a formerly weak crown condition that has been broken off by adverse weather conditions or other mechanical means.
    - (8) Regenerated or Regenerating—formerly broken out crowns that are now growing back. Regenerating crowns may appear healthy, average, or weak and indicate current health of the tree.
    - (9) Suppressed—a term used to describe poor condition of an entire tree or just the crown. Suppressed crowns are those that are entirely below

the general level of the canopy of surrounding trees which receive no direct sunlight. They are generally in poor health and vigor. Suppressed trees are generally trees that are smaller and growing in the shade of larger trees around them. They generally have thin or sparse needles, weak or missing crowns, and are prone to insect attack as well as bacterial and fungal infections.

- 10) **TRUNK**—this is the area to note any defects that can have an impact on the tree's stability or hazard potential. Typical things noted are:
- i) **FORKED**—bifurcation of branches or trunks that often occur at a narrow angle.
  - ii) **INCLUDED BARK**—a pattern of development at branch or trunk junctions where bark is turned inward rather than pushed out. This can be a serious structural defect in a tree that can and often does lead to failure of one or more of the branches or trunks, especially during severe, adverse weather conditions.
  - iii) **EPICORMIC GROWTH**—this is generally seen as dense thick growth near the trunk of a tree. Although this looks like a healthy condition, it is, in fact the opposite. Trees with Epicormic Growth have used their reserve stores of energy in a last ditch effort to produce enough additional photosynthetic surface area to produce more sugars, starches and carbohydrates to support the continued growth of the tree. Generally speaking, when conifers in the Pacific Northwest exhibit heavy amounts of Epicormic Growth, they are not producing enough food to support their current mass and are already in serious decline.
  - iv) **INTERNAL STRUCTURAL WEAKNESS**—a physical characteristic of the tree trunk, such as a **kink, crack, rot pocket, or rot column** that predisposes the tree trunk to failure at the point of greatest weakness.
  - v) **BOWED**—a gradual curve of the trunk. This can indicate an Internal Structural Weakness or an overall weak tree. It can also indicate slow movement of soils or historic damage of the tree that has been corrected by the curved growth.
  - vi) **KINKED**—a sharp angle in the tree trunk that indicates that the normal growth pattern is disrupted. Generally this means that the internal fibers and annual rings are weaker than straight trunks and prone to failure, especially in adverse weather conditions.
  - vii) **GROUND FLOWER**—an area of deformed bark near the base of a tree trunk that indicates long-term root rot.
- 11) **ROOT COLLAR**—this is the area where the trunk enters the soil and the buttress roots flare out away from the trunk into the soil. It is here that signs of rot, decay, insect infestation, or fungal or bacterial infection are noted. **NAD** stands for **No Apparent Defects**.
- 12) **ROOTS**—any abnormalities such as girdling roots, roots that wrap around the tree itself that strangle the cambium layer and kill the tree, are noted here.



- 13) **COMMENTS**—this is the area to note any additional information that would not fit in the previous boxes or attributes about the tree that have bearing on the health and structure of the tree.
- 14) **CURRENT HEALTH RATING**—A description of the tree’s general health ranging from dead, dying, poor, senescent, suppressed, fair, good, very good, to excellent.
- 15) **LIKELIHOOD OF FAILURE**—This is rated on a scale from Improbable, Possible, Probable to Imminent.
- i) This is primarily determined by site factors, defects and conditions, load on the tree or tree part, response growth, tree health, and tree species.
- 16) **HAZARD RATING**—The risk rating is determined by comparing the Likelihood of Failure and Impact with the Consequences of Failure.
- i) It is expressed on a scale ranging from Low Risk, Moderate Risk, High Risk, and Extreme Risk.
  - ii) Each of these has a range of alternate responses to manage the risk down to an acceptable level and depends upon the unique circumstances of the tree or tree part, and the potential target(s).
- 17) **RECOMMENDATION**—This is a management action or actions to reduce the risk down to an acceptable level. The range of recommendations could be one of the following:
- i) **Retain and Monitor:** “Monitor” is a specific recommendation that the tree be re-evaluated on a routine basis to determine if there are any significant changes in health or structural stability. This yearly monitoring can be a quick look at the trees to see if there are any significant changes. Significant changes such as storm damage, loss of crown, partial failure of one or more roots, etc. require that a full evaluation be done of the tree at that time.
  - ii) **Reduce end weight:** Where there are extraordinarily long heavy limbs over the road or a house, these can be pruned to lighten and shorten them.
  - iii) **Structural Support**—This can include the use of cables, braces, and or props to reduce the risk of failure.
  - iv) **Habitat or Remove:** means that the tree has a high potential to fail and cause either personal injury, property damage, or disruption of services such as utilities or traffic—in other words the tree has been declared a hazard tree and should be dealt with prior to the next large storm.
    - (1) If it is at all possible the recommendation is to leave some of the trunk standing for wildlife habitat and some of the trunk on the ground as a nurse log.
      - a) The height of the standing habitat tree depends upon the size of the tree, the condition of the tree, and the distance to a probable target. It should be short enough so that when it does fail years in the future it will not cause personal injury or property damage.
      - b) Nurse logs can be laid horizontally across the slope to aid with erosion control and to provide microenvironments for new plantings. The nurse logs may need to be staked in place to prevent

their movement and potential harm to people. If for some reason this is not possible that should be removed for safety.

**NOTE: TREES WITH THE SAME DESCRIPTION AND DIFFERENT RATINGS:**

Two trees may have the same descriptions in the matrix boxes, one may be marked “Significant,” while another may be marked “Non-Significant.” The difference is in the degree of the description, i.e., “early necrosis” versus “advanced necrosis” for instance. Another example is “center rot” or “base rot”. In a Western Red Cedar tree, the presence of low or even moderate rot is not significant and does not diminish the strength of the tree. However, low levels of rot in the base of a Douglas Fir tree, in an area known to have virulent pathogens present, is highly significant and predisposes that tree to windthrow.

## ATTACHMENT 4 - HABITAT TREE, NURSE LOG, BRUSH PILE CREATION AND BENEFITS

There are occasions where hazardous trees need not be completely removed. Shortening is the preferred methods in these types of areas rather than complete removal. Standing dead trees, also known as “*vertical structure*” in forest ecology terms, provide important wildlife habitat. Recent studies at the University of Washington have shown that the third most significant reason for the decline of songbirds in the Puget Sound region is the lack of standing dead trees, nurse logs, and brush piles. (The primary reason for the decline of desirable wildlife is loss of habitat. The second reason is predation by dogs, cats, Grey Squirrels, and Opossums.)



These studies reveal that as many as 54% of desirable urban wildlife utilize standing dead trees, nurse logs and brush piles on the ground in one or more important life cycle. For instance, Black Capped Chickadees must excavate a new cavity every spring in order to successfully mate and produce a brood of off spring.

The opportunity exists here to remove the dangerous portions of these trees and leave the snags standing for wildlife. You can also place the upper trunk sections carefully on the ground as nurse logs. The logs, if in contact with the ground, soak up moisture and release it slowly throughout the summer. This supports plants and animals in the immediate area. Brush piles strategically placed for birds and mammals to use as safe areas also have

important wildlife benefits. These two measures have the added benefit of reducing the cost because a tree service does not need to do as much clean up or removal.

The tree service selected can spend a few extra minutes on the top of each snag to make the cut look like it was snapped off in the wind—jagged and irregular. This enhances the aesthetic appeal of the tree.



## VALUE OF BRUSH PILES

In general, the concept of shelter is important to urban wildlife. In his book, *Landscaping for Wildlife in the Pacific Northwest*, Wildlife Biologist Russell Link writes, “Shelter, (also called cover) is a place to raise young, hide from predators, and avoid the heat, cold, and wind. Shelter also provides a place to feed, play, and rest safely. The quality of shelter is particularly important for young animals in a nest. Unlike an animal that can flee when a predator approaches, young birds or small mammals must rely entirely upon the cover and the camouflage of the nest itself.”

Different birds and mammals will use different parts of the brush pile as Table 1 Wildlife that use an average-size brush pile from page 123 of Mr. Link’s book notes:

For instance, insects will be attracted to the inside of brush piles that will become food or other animals. “The inside of the pile can also protect wildlife from sun, rain, and predators. During strong winds, birds that would ordinarily use an evergreen tree for evening shelter may instead use a brush pile located on the ground out of the wind. Far into a pile, mammals and some birds find nesting cover in the tight network of strong twigs. The outside, where the sticks protrude from the pile, provides places for birds to perch and sign, preen, and catch insects. If the base of the pile contains large limbs or logs, salamanders, snakes, and lizards may hibernate there. Ants, worms, beetles, and other insects will live and feed in the rich soil beneath a pile.

TABLE 1. WILDLIFE THAT USE AN AVERAGE--SIZE BRUSH PILE			
Birds That Will Use the Inside of the Brush Pile:	Birds That Will Use the Outside of the Brush Pile:	Mammals That Will Use the Inside of the Brush Pile:	Reptiles and Amphibians That Will Use the Base of the Brush Pile:
Bushtits	Grouse	Chipmunks	Alligator Lizards
Chickadees	Hummingbirds	Cottontail Rabbits	Salamanders
Dark-eyed Juncos	Jays	Fox	Snakes
Flycatchers	Pheasants	Ground Squirrels	Toads
Golden-crowned Sparrows	Robins	Mice	Turtles
Grouse	Song Sparrows	Rabbits	
Pheasants	Towhees	Shrews	
Quail	Warblers	Skunks	
Song Sparrows	White-Crowned Sparrows	Voles	
Thrushes	Woodpeckers	Weasels	
Towhees		Woodrats	
White-Crowned Sparrows			
Wrens			



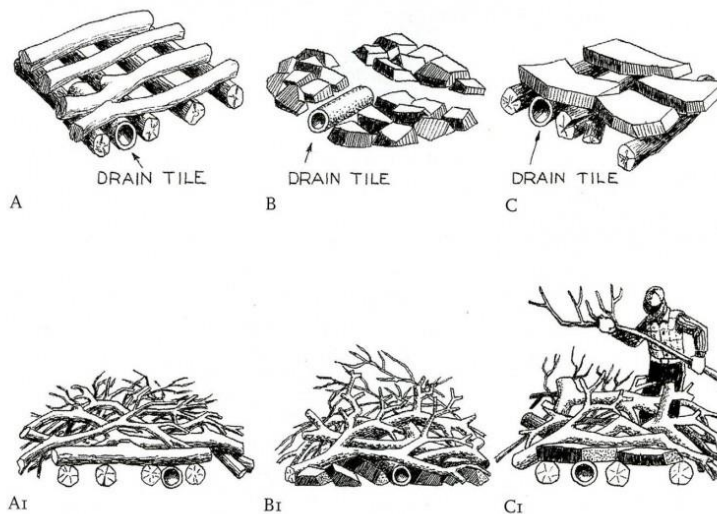
When snow covers a brush pile, a complex array of snow free spaces and runways provides important habitat for protection and foraging by small mammals.” From pages 122 & 123, *Landscaping for Wildlife in the Pacific Northwest* by Russell Link.

Brush piles can be simple hand thrown piles of bio-debris and rocks or they can be large designed piles.



An example of a simple Christmas tree brush pile.

A large brush pile from many trees piled together. This one is older with the foliage all fallen from the branches and twigs. But, it can provide cover for years.



A schematic design for three more complex brush piles.

## ATTACHMENT 5 - BIBLIOGRAPHY

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